

**X. Of the Culture and Uses of the Son or Sun-plant of Hindostan, with an Account of the manner of manufacturing the Hindostan Paper. By Lieutenant Colonel Ironside. Communicated by Dr. Heberden \*.**

Redde, Dec. 23, 1773. **T**HIS useful plant, I believe, is cultivated all over Hindostan. The seeds are sown in July, before the rains begin; they should be sown near to one another, to make the stem rise higher, more erect, with fewer branches, and to encrease the produce. It flowers in October, and is taken up in December.

The black ladies use the seeds, reduced to powder and mixed with oil, for their hair, upon a supposition, that this composition will make their hair grow to a great length, which they are very fond off.

From the bark are made all kinds of rope, packing cloths, nets, &c. and from these, when old, most of the paper, in this country, is prepared; for

\* This Plant is described by Linnæus, under the name of *Crotalaria juncea*, vid. Spec. Plant. 1604. A figure of it is given by Ehret in Trews Plant. Select. t. 47. and another in the Hort. Malab. 9. p. 47. t. 26. Both these figures are good.

these purposes, the fresh plant is steeped four days in water, afterwards dried, and treated as the *cannabis* for hemp, to which it is so similar when prepared, that Europeans generally suppose it to be the produce of the same plant.

As the substances, producing cloths, ropes, and paper, are few in present use, this plant may perhaps be cultivated with advantage, in some of the British West India settlements, and in other countries destitute of hemp and flax. It is not improbable, that it may be raised in the warmer climates of Europe, as it ripens here in winter. I cannot say, what soils it may refuse; where I have seen it, in the greatest plenty and perfection, has generally been upon an earth composed of clay, calcareous grit, and sand.

There are other vegetable substances used here for the purpose of rope making; one of them is a species of the *hibiscus*, a description of which I propose for the subject of another paper: I can scarce doubt, but that it is only for want of experiments, we have not a greater number of vegetables rendered useful in this manner. The class *Monadelphia*, of *LINNÆUS*, promises fair for trials of this kind.

### The Hindostan method of manufacturing Paper.

The manufacturer purchases old ropes, cloths, and nets, made from the sun plant, and cuts them into small pieces, macerates them in water, for a few days, generally five, washes them in the river in a basket, and throws them into a jar of water lodged

lodged in the ground ; the water is strongly impregnated with a lixivium of sedgi mutti \* six parts and quick lime seven parts. After remaining in this state eight or ten days, they are again washed, and while wet, broken into fibres, by the stamping lever, Fig. 1. [TAB. VII.] and then exposed to the sun, upon a clean terrace, built for this purpose ; after which, they are again steeped, in a fresh lixivium, as before. When they have undergone three operations of this kind, they are fit for making coarse brown paper ; after seven or eight operations, they are prepared for making paper, of a tolerable whiteness.

The rags, thus prepared, are mixed with water in the cistern, Fig. 2. at the edge of which the operator sits, and removing the stick, he extends the screen, Fig. 3. upon the frame, Fig. 4. with which he agitates the water in the cistern, until it appears of a milky whiteness, by the floating particles of the rags ; he then dips the frame and screen, in a perpendicular manner, and raises them gently, in a horizontal position, to the surface of the water, where he gives the frame a gentle motion, from side to side, or from end to end, to make the particles of the rags fall in an equal layer upon the screen, and then he lifts them out of the water, and rests them for the space of a minute upon the stick 3, in Fig. 3. After repeating the dip once more in the same manner, the new sheet

\* Sedgi Mutti is an earth, containing a large portion of fossil alkali. The *vætpov* of the antiquits. It is found in great plenty in this country, and universally used in washing, bleaching, soap-making, and for various other purposes.

of paper is formed; then, taking off the extensors, BB, of the screen, he rolls inwards, for about an inch, the upper part of the screen and sheet, by which means, so much of the sheet will be separated from the screen; the screen is then inverted, and the already separated end of the paper is laid upon the mat, in Fig. 5, and the screen is gently raised from the paper.—In this manner he forms sheet after sheet, until he has made 250, his day's task, laying them all upon the first sheet, in a regular manner; then he covers the whole with a coarse cloth of the sun-plant, equal in size with the paper; above this he lays a thick plank, somewhat larger than the paper. This, by its weight, presses out the water from the wet sheets; to assist which, the operator sits upon it for some time. Then the heap is set to one side until morning, when the sheets are taken up, one by one, and spread with the brush, Fig. 6, upon the clean plastered walls of the houle; as they dry, they readily peel off, and are spread upon a clean mat or cloth, and with a piece of blanket, dipped in thin rice paste water, rubbed all over, and immediately hung up, to dry, upon strings run across the house for this purpose. When sufficiently dried, they are cut into a quadrangular form, according to a standard sheet, which serves as a guide to the knife, Fig. 7. From this operation, they are carried to another person, who rubs every sheet smooth with a globular piece of moorstone granite, which he holds in both hands. Then he folds the sheets for sale. The finer paper is polished a second time. All the cuttings, and damaged sheets

sheets, are trampled to pieces in water, and renovated as above.

Instruments used in making the paper. TAB. VII.

- Fig. 1st. *a.* A stamping lever, ten feet long, and seven inches squared timber.
- b.* Two pieces of wood, fixed in the floor, to support the axis of the lever.
- c.* This end of the lever is pressed down by the feet of two men.
- d.* Is a stick, suspended from the roof of the house, to which are fastened four ropes which support the arms of the workmen.
- e.* The head of the stamper four feet long, and four inches squared timber, bound and shod at the point with iron.
- ff.* A perpendicular section of a terrassed cistern, dug in the ground-floor about 4 or 5 feet square.
- gg.* A square stone, in the bottom of the cistern, excavated in the middle, to receive the head of the stamper, by which the rags are beat to pieces. A person is stationed in the cistern, to supply the stamper with rags.
- Fig. 2d. 1. 1. A terrassed cistern, dug in the floor, 4 or 5 feet square, having two little eminences,
- 2. 2. at the edge, to support the stick
- 3. occasionally.
- 4. A jar, lodged in the floor, to hold in readiness the prepared rags.

Fig.

Fig. 3d. Is made in the manner of the Chinese bamboo window-screens. The transverse lines are fine rush, or a grass, neatly bound with horse hairs, which makes the longitudinal lines.

*A A.* Two sticks, to which the screen is fastened, and extended by the two sticks,  
*B B.* occasionally.

Fig. 4th. A form of wood, with seven bars, to support the screen, Fig. 3d. The bars are so fixed, as that their acute edges only touch the screen, that there may be no obstruction to the passage of water through the screen.

Fig. 5th. *aa.* Is a terras, 4 or 5 feet square, inclined a few inches, that water may readily run from it.

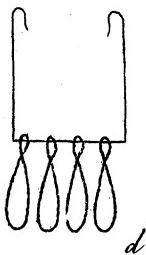
*bb.* A mat or board laid upon the terras.

*cc.* The new formed sheet of paper laid upon the mat.

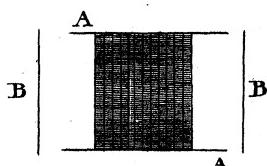
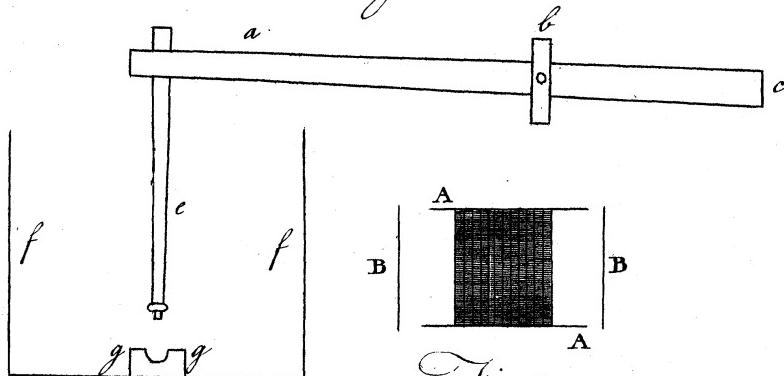
Fig. 6th. A flat hair brush for spreading the wet paper upon the walls of the house.

Fig. 7th. The double edged knife with which the paper is cut into a proper form.

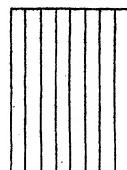
*Instruments used in making  
Hindostan' Paper.*



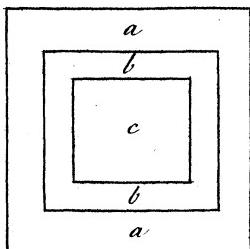
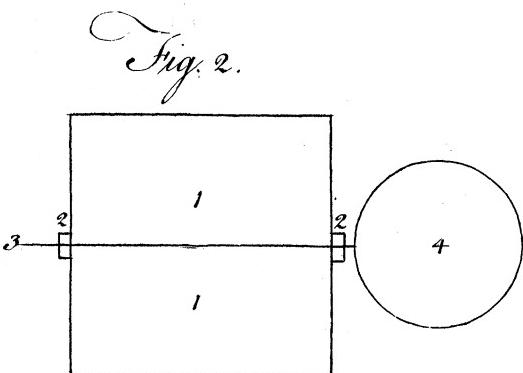
*Fig. 1.*



*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



*Fig. 7.*